

AMENDMENTS TO THE CLAIMS

1. (Previously presented) A process for preparing tetrahydropyran-4-one represented by the formula (1):



which comprises reacting at least one kind of dihydropyran-4-one and pyran-4-one represented by the formula (2):



wherein --- represents a single bond or a double bond,

and hydrogen

(a) in the presence of a metal catalyst, in a mixed solvent of an aprotic solvent and an alcohol solvent, or

(b) in the presence of an anhydrous metal catalyst in which a hydrated metal catalyst is subjected to dehydration treatment, in a hydrophobic organic solvent.

2. (Withdrawn) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the dehydration treatment is carried out by using an organic solvent which can be subjected to azeotropic distillation with water.

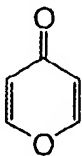
3. (Previously presented) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the metal catalyst contains at least one metal atom selected from the group consisting of palladium, platinum and nickel.

4. (Previously presented) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the aprotic solvent is an aliphatic hydrocarbon, a halogenated aliphatic hydrocarbon, an aromatic hydrocarbon, a halogenated aromatic hydrocarbon, a carboxylic acid ester, an ether, or a mixture thereof.

5. (Previously presented) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein an alcohol solvent in the mixed solvent is contained in the range of 5 to 95% by volume.

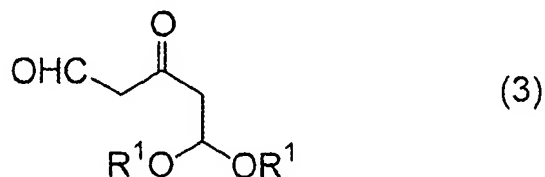
6. (Withdrawn) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the hydrophobic organic solvent is an aliphatic hydrocarbon or an aromatic hydrocarbon.

7. (Previously presented) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the compound represented by the formula (2) is pyran-4-one represented by the formula (2'):



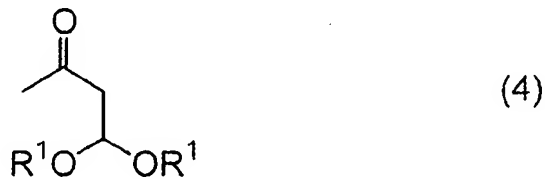
(2')

8. (Withdrawn) The process for preparing tetrahydropyran-4-one according to Claim 7, wherein the pyran-4-one represented by the formula (2') is a compound obtained by reacting 5,5-dialkoxy-3-oxopentanal represented by the formula (3):

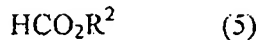


wherein R¹ represents an alkyl group, and two R¹'s may be bonded to each other to form a ring,
or an equivalent thereof, or a salt thereof with an acid.

9. (Withdrawn) The process for preparing tetrahydropyran-4-one according to Claim 8, wherein a salt of the 5,5-dialkoxy-3-oxopentanal represented by the formula (3) or a salt of an equivalent thereof is a compound obtained by reacting 1,1-dialkoxybutan-3-one represented by the formula (4):

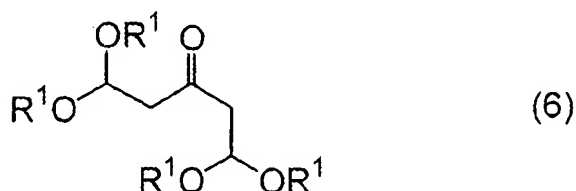


wherein R¹ has the same meaning as defined above,
and a formic acid ester represented by the formula (5):



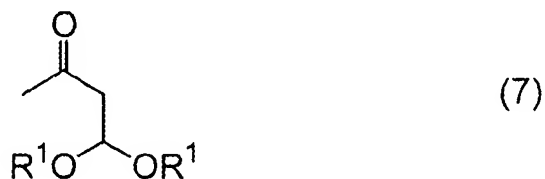
wherein R² represents an alkyl group,
in an organic solvent in the presence of a base,

10. (Withdrawn) The process for preparing tetrahydropyran-4-one according to Claim 7, wherein the pyran-4-one represented by the formula (2') is a compound obtained by subjecting 1,1,5,5-tetraalkoxypentan-3-one represented by the formula (6):

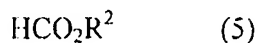


wherein R¹ has the same meaning as defined above,
or an equivalent thereof to cyclization in the presence of an acid.

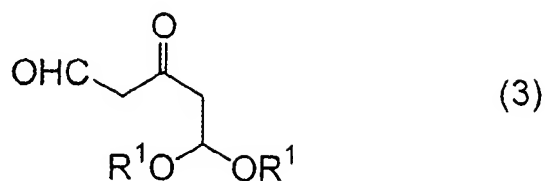
11. (Withdrawn) The process for preparing tetrahydropyran-4-one according to Claim 7, wherein the pyran-4-one represented by the formula (2') is a compound obtained by reacting 1,1-dialkoxybutan-3-one represented by the formula (7):



wherein R¹ has the same meaning as defined above,
or an equivalent thereof and a formic acid ester represented by the formula (5):



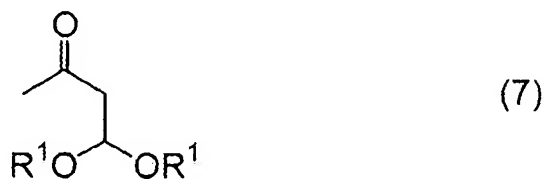
wherein R² has the same meaning as defined above,
in an organic solvent in the presence of a base, to form a salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



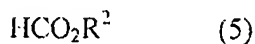
wherein R¹ has the same meaning as defined above,
or a salt of an equivalent thereof, then, reacting an acid thereto.

12. (Withdrawn) The process for preparing tetrahydropyran-4-one according to Claim 11,
wherein the organic solvent is an aromatic hydrocarbon or a nitrile.

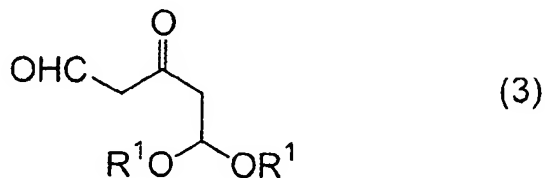
13. (Withdrawn) A process for preparing tetrahydropyran-4-one which comprises two steps of
(A) cyclization step in which 1,1-dialkoxybutan-3-one represented by the formula (7):



wherein R¹ represents an alkyl group, and two R¹s may be bonded to form a ring,
and a formic acid ester represented by the formula (5):



wherein R² represents an alkyl group,
are reacted in an organic solvent in the presence of a base, to prepare a salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



wherein R¹ has the same meaning as defined above,

or a salt of an equivalent thereof, and reacting the salt with an acid to prepare crude product containing pyran-4-one represented by the formula (2'):



as a main component, then,

(B) reduction step in which the crude product containing the pyran-4-one as a main component and hydrogen are reacted in the presence of a metal catalyst,

(a) in a mixed solvent of an aprotic solvent and an alcohol solvent, or

(b) in the presence of an anhydrous metal catalyst in which a hydrated metal catalyst is subjected to dehydration treatment, in a hydrophobic solvent, to prepare tetrahydropyran-4-one represented by the formula (1):



14. (Withdrawn) The process for preparing tetrahydropyran-4-one according to Claim 13, wherein the metal catalyst contains at least one metal atom selected from the group consisting of palladium, platinum and nickel.

15. (Withdrawn) The process for preparing tetrahydropyran-4-one according to Claim 13, wherein the aprotic solvent is an aliphatic hydrocarbon, a halogenated aliphatic hydrocarbon, an

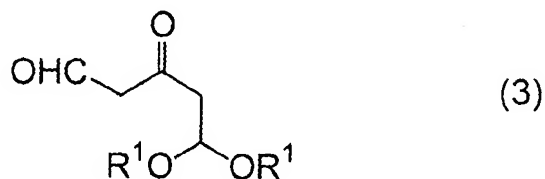
aromatic hydrocarbon, a halogenated aromatic hydrocarbon, a carboxylic acid ester, an ether, or a mixture thereof.

16. (Withdrawn) The process for preparing tetrahydropyran-4-one according to Claim 13, wherein an alcohol solvent in the mixed solvent is contained in the range of 5 to 95% by volume.

17. (Withdrawn) A process for preparing pyran-4-one represented by the formula (2'):

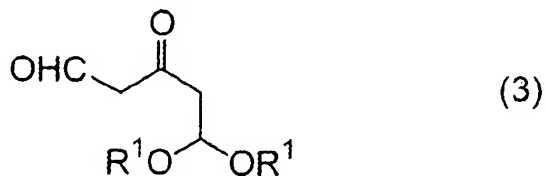


which comprises reacting 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



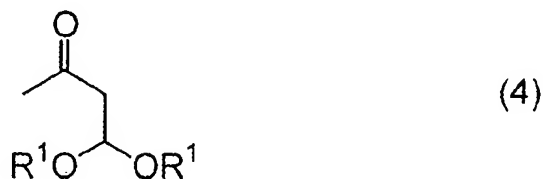
wherein R¹ represents an alkyl group, and two R¹'s may be bonded to form a ring, or an equivalent thereof, or a salt thereof with an acid.

18. (Withdrawn) A process for preparing a salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



wherein R¹ has the same meaning as defined above,

or an equivalent thereof, which comprises reacting 1,1-dialkoxybutan-3-one represented by the formula (4):



wherein R¹ represents an alkyl group, and two R¹'s may be bonded to form a ring,
and a formic acid ester represented by the formula (5):

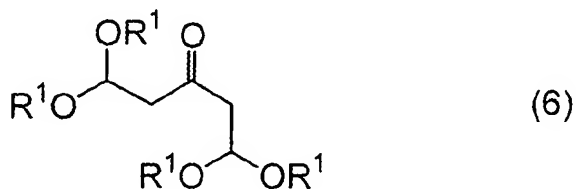


wherein R² represents an alkyl group,
in an organic solvent in the presence of a base.

19. (Withdrawn) A process for preparing pyran-4-one represented by the formula (2'):

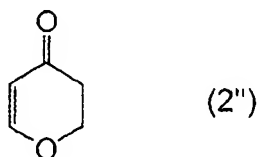


which comprises subjecting 1,1,5,5-tetraalkoxypentan-3-one represented by the formula (6):

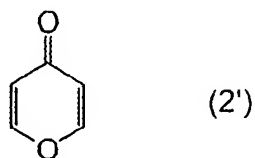


wherein R¹ represents an alkyl group, and two R¹'s may be bonded to form a ring,
or an equivalent thereof to cyclization in the presence of an acid.

20. (Withdrawn) A process for preparing dihydropyran-4-one represented by the formula (2''):

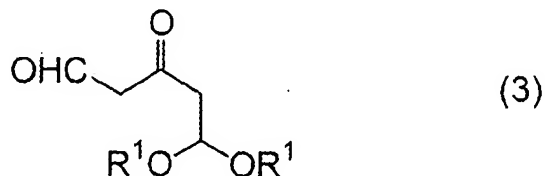


which comprises reacting pyran-4-one represented by the formula (2'):



and hydrogen in the presence of a metal catalyst, in a mixed solvent of an aprotic solvent and an alcohol solvent.

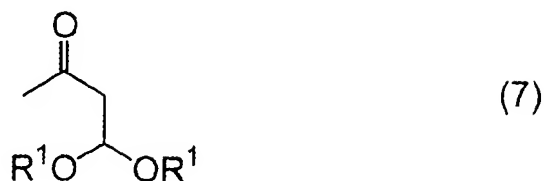
21. (Withdrawn) A sodium salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



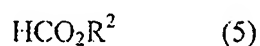
wherein R¹ represents an alkyl group, and two R¹s may be bonded to each other to form a ring.

or a sodium salt of an equivalent thereof.

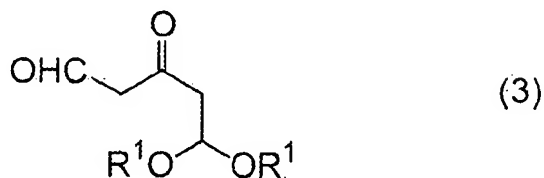
22. (Withdrawn) A process for preparing pyran-4-one which comprises reacting 1,1-dialkoxybutan-3-one represented by the formula (7):



wherein R^1 represents an alkyl group, and two R^1 's may be bonded to each other to form a ring,
or an equivalent thereof and a formic acid ester represented by the formula (5):



wherein R^2 represents an alkyl group,
in an organic solvent in the presence of a base, to form a salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



wherein R^1 has the same meaning as defined above,
or a salt of an equivalent thereof, and then, reacting an acid to the salt to prepare pyran-4-one represented by the formula (2'):



23. (Withdrawn) Use of an anhydrous metal catalyst for reducing pyran-4-one and dihydropyran-4-one.

24. (Withdrawn) The process for preparing tetrahydropyran-4-one according to claim 1, wherein the anhydrous metal catalyst is a material obtained by subjecting a hydrated metal catalyst to dehydration treatment using an organic solvent which can be subjected to azotropic distillation with water.

25. (New) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the catalyst is at least one selected from the group consisting of palladium/carbon, palladium/barium sulfate, palladium hydroxide/platinum, platinum/carbon, platinum sulfate/carbon, palladium-platinum/carbon, platinum oxide and Raney nickel.

26. (New) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein an amount of the catalyst is 0.0001 to 5 mol based on 1 mol of the pyran-4-one or dihydropyran-4-one in terms of a metal atom.

27. (New) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein an amount of the catalyst is 0.001 to 0.1 mol based on 1 mol of the pyran-4-one or dihydropyran-4-one in terms of a metal atom.

28. (New) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein an amount of the hydrogen to be used in the reaction is 0.5 to 20 mol based on 1 mol of the pyran-4-one or dihydropyran-4-one.

29. (New) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the solvent contains 1 to 95% by volume of the alcohol solvent.

30. (New) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the solvent contains 5 to 90% by volume of the alcohol solvent.

31. (New) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the reaction is carried out at a reaction temperature of 0 to 100°C under a reaction pressure of 0.1 to 10 MPa.

32. (New) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the reaction is carried out at a reaction temperature of 0 to 100°C under a reaction pressure of 0.1 to 1 MPa.

33. (New) The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the reaction is carried out at a reaction temperature of 5 to 60°C under a reaction pressure of 0.1 to 1 MPa.